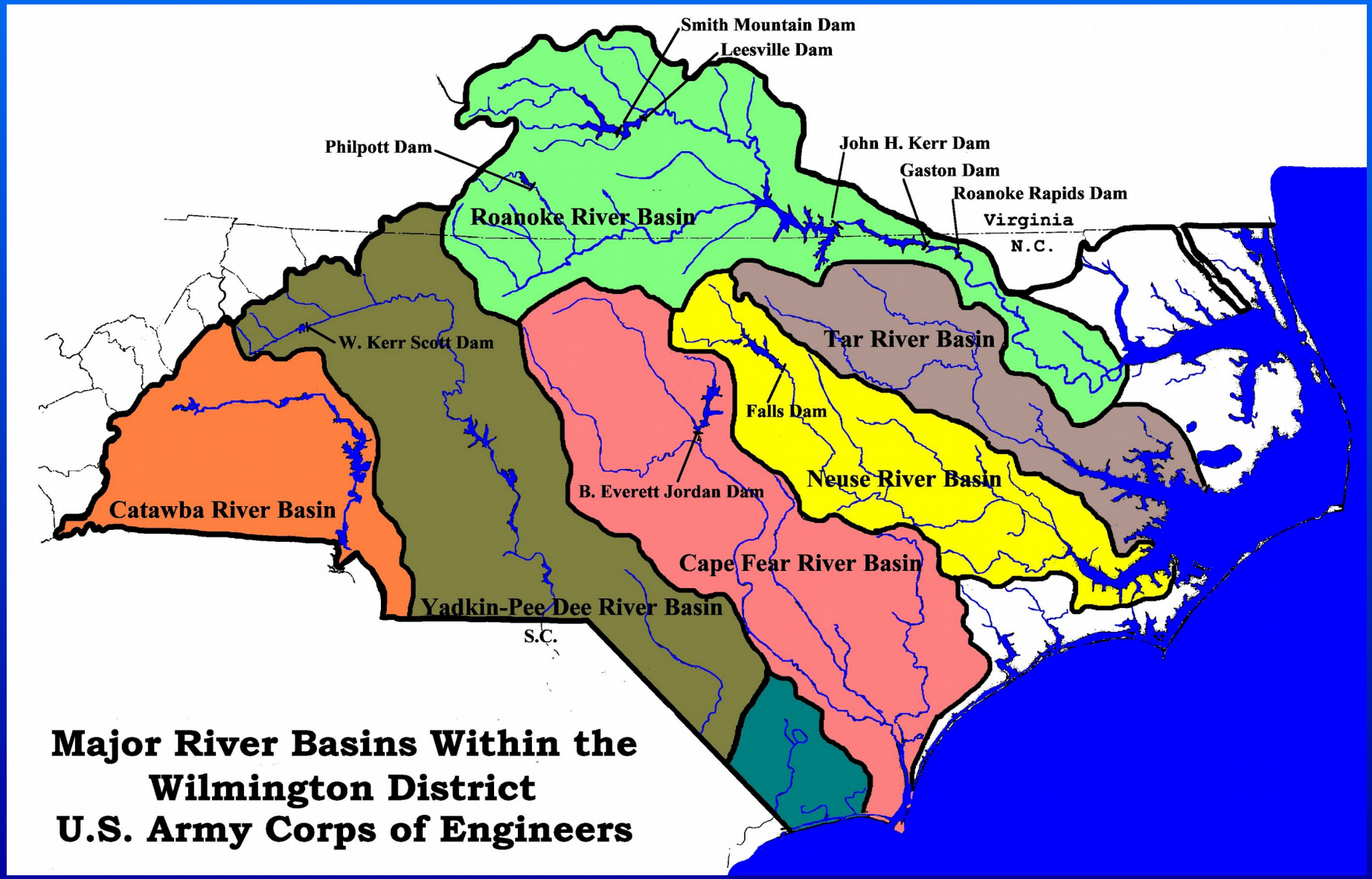
U.S. Army Corps of Engineers
Wilmington District

Real-Time Conservation Pool Storage Accounting for the Falls Lake

Falls Lake Project



Falls Lake Filled to Normal Pool Level on December 7th, 1983

Falls Lake Project Purposes

Flood Control

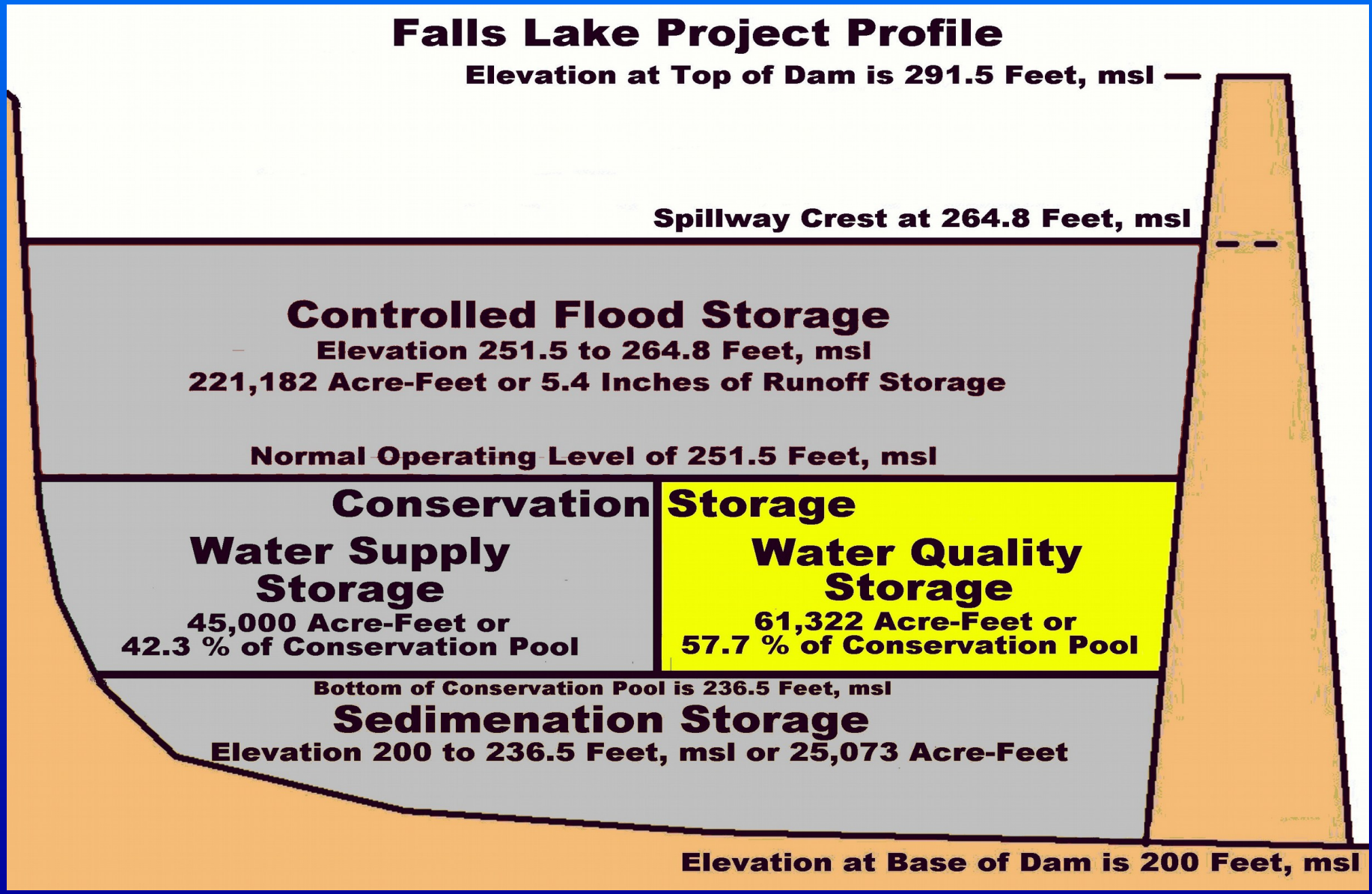
Water Quality

Water Supply

Wildlife Enhancement

Recreation

Falls Lake Water Quality


Falls Lake Project Profile
Elevation at Top of Dam is 291.5 Feet, msl
Spillway Crest at 264.8 Feet, msl
Controlled Flood Storage
Elevation 251.5 to 264.8 Feet, msl
221,182 Acre-Feet or 5.4 Inches of Runoff Storage
Normal Operating Level of 251.5 Feet, msl
Conservation Storage
Water Supply Storage
45,000 Acre-Feet or
42.3 % of Conservation Pool
Water Quality Storage
61,322 Acre-Feet or
57.7 % of Conservation Pool
Bottom of Conservation Pool is 236.5 Feet, msl
Sedimenation Storage
Elevation 200 to 236.5 Feet, msl or 25,073 Acre-Feet
Elevation at Base of Dam is 200 Feet, msl

Falls Lake Water Quality

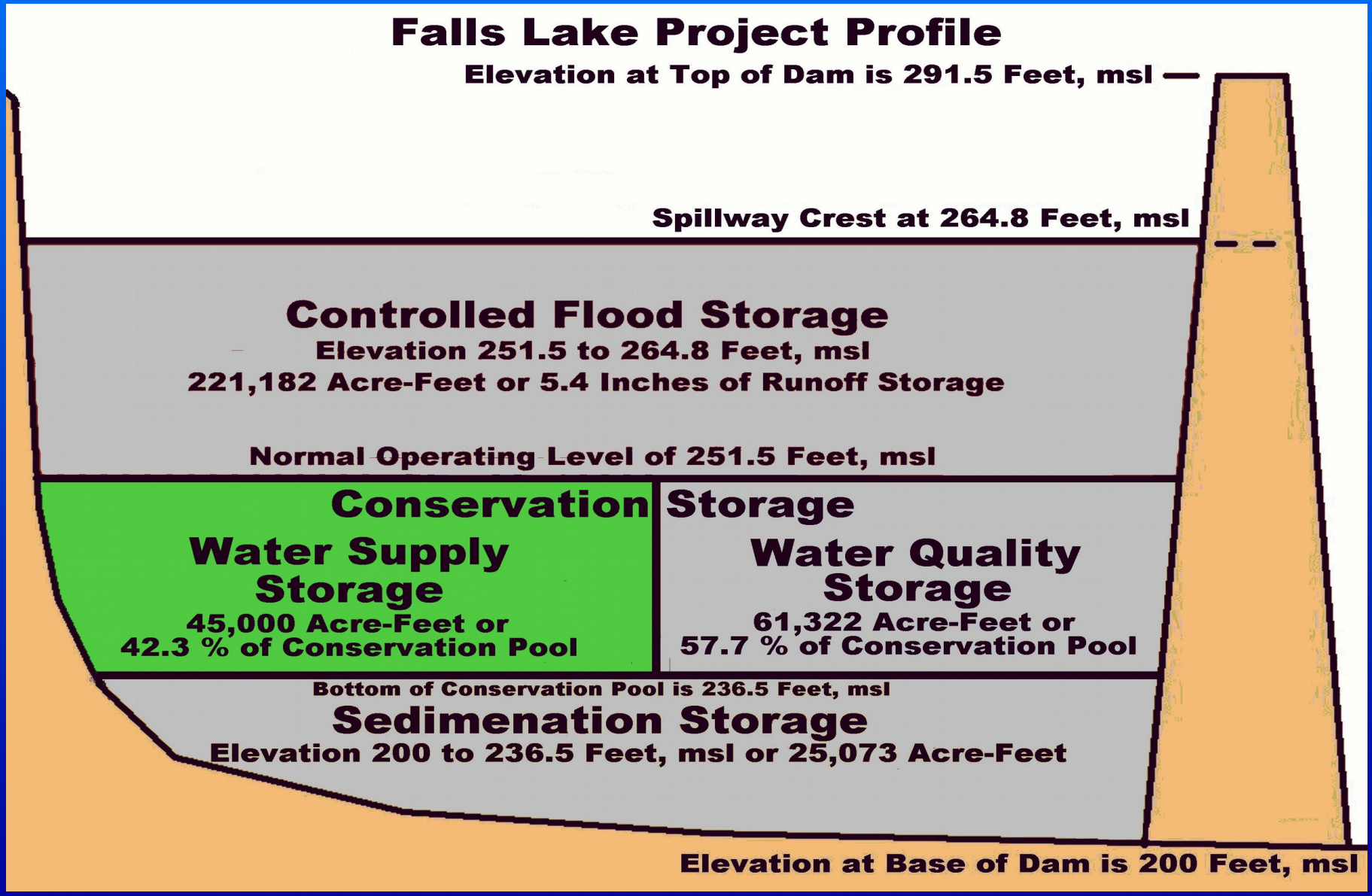
- **Water quality gates in the intake tower allow selective withdrawal**

- **Two Downstream flow targets:**

  - **Immediately Downstream of Falls Dam**

  - **At Clayton located 32 miles**

Falls Lake Water Supply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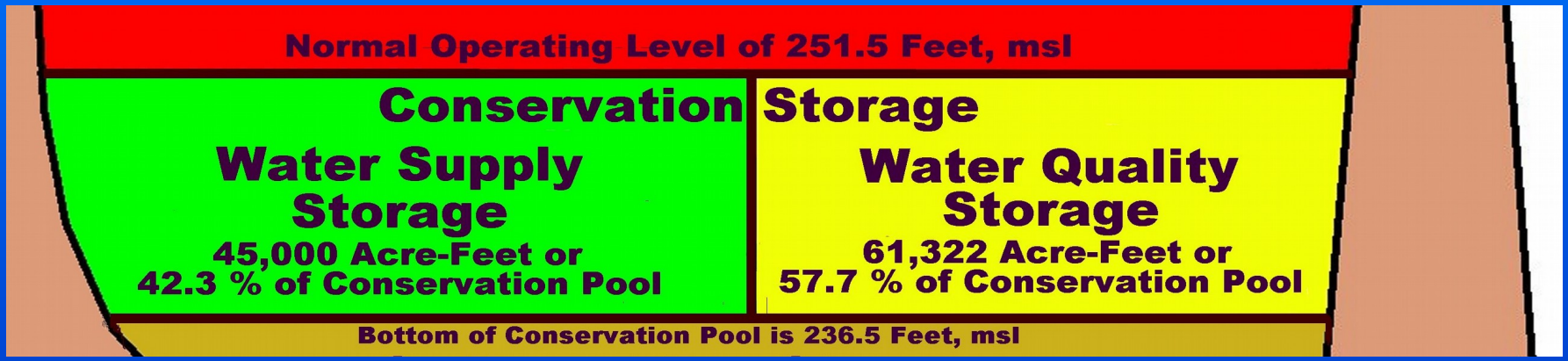
Falls Lake Water Supply

- **The City of Raleigh has the right to utilize 100% of the water supply storage (45,000 acre-feet) in Falls Lake**

- **The yield is about 63 mgd in the worse drought of record (prior to the**

Falls Lake Storage Accounting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- **Since the conservation storage is host to both the water supply and water quality pools (or any shared storage), how is the storage remaining in either pool tracked in a drought situation?**

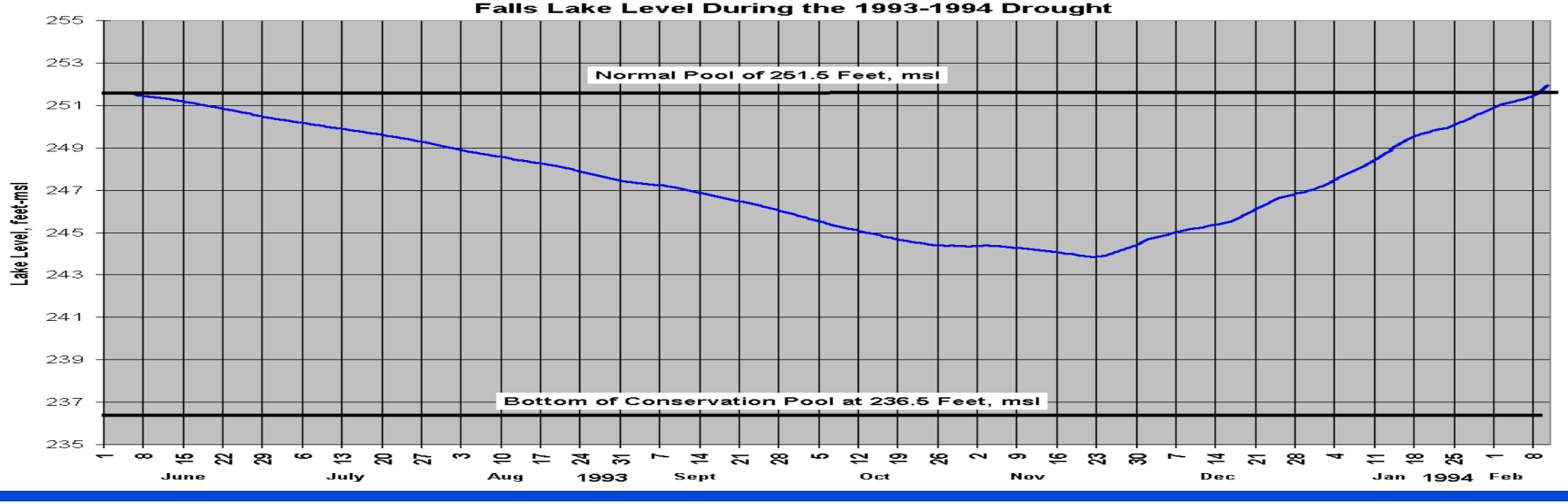
- **Further question--why track the**

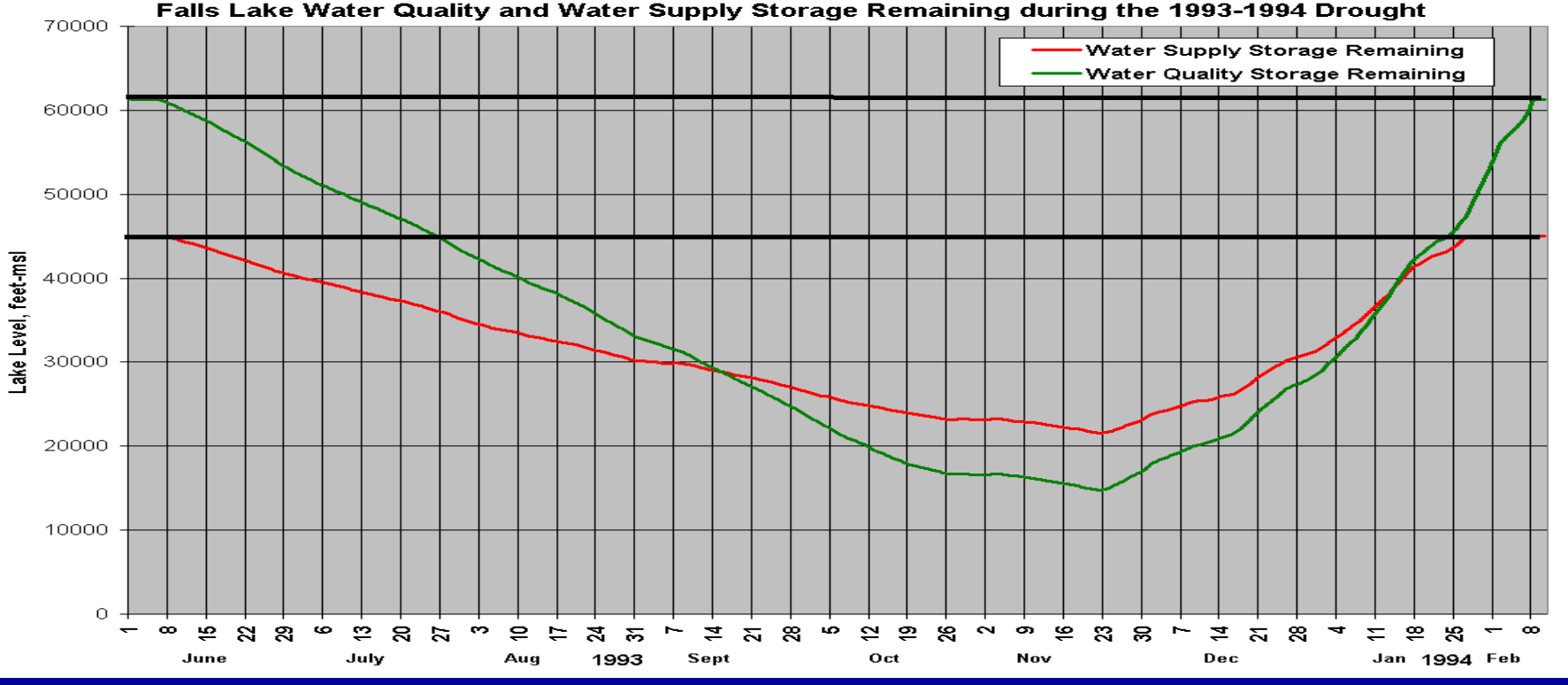
Falls Lake Storage Accounting

Question: Why track the remaining storage?

- **because neither purpose bottoms out simultaneously at the same time with zero storage remaining when the lake level drops to the bottom of the conservation pool.**

- **additionally, neither purpose will refill at the same rate nor refill to full capacity at the same time.**


Falls Lake Level During the 1993-1994 Drought
Lake Level, feet-msl
255
253
251
249
247
245
243
241
239
237
235
Normal Pool of 251.5 Feet, msl
Bottom of Conservation Pool at 236.5 Feet, msl
1 8 15 22 29 6 13 20 27 3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 7 14 21 28 4 11 18 25 1 8
June July Aug 1993 Sept Oct Nov Dec Jan 1994 Feb


Falls Lake Water Quality and Water Supply Storage Remaining during the 1993-1994 Drought
Lake Level, feet-msl
70000
60000
50000
40000
30000
20000
10000
0
Water Supply Storage Remaining
Water Quality Storage Remaining
1 8 15 22 29 6 13 20 27 3 10 17 24 31 7 14 21 28 5 12 19 26 2 9 16 23 30 7 14 21 28 4 11 18 25 1 8
June July Aug 1993 Sept Oct Nov Dec Jan 1994 Feb

Falls Lake Storage Accounting

Question: Why track the remaining storage?

- **to determine the viability of either project purpose, ie, how long can Falls Lake continue to meet the project purposes at the current rate of use,**

- **if the drought contingency plan needs to be activated for either purpose.**

Falls Lake Storage Accounting

Question:

So how do we track the individual storage pools?

Answer:

Storage accounting!!!!

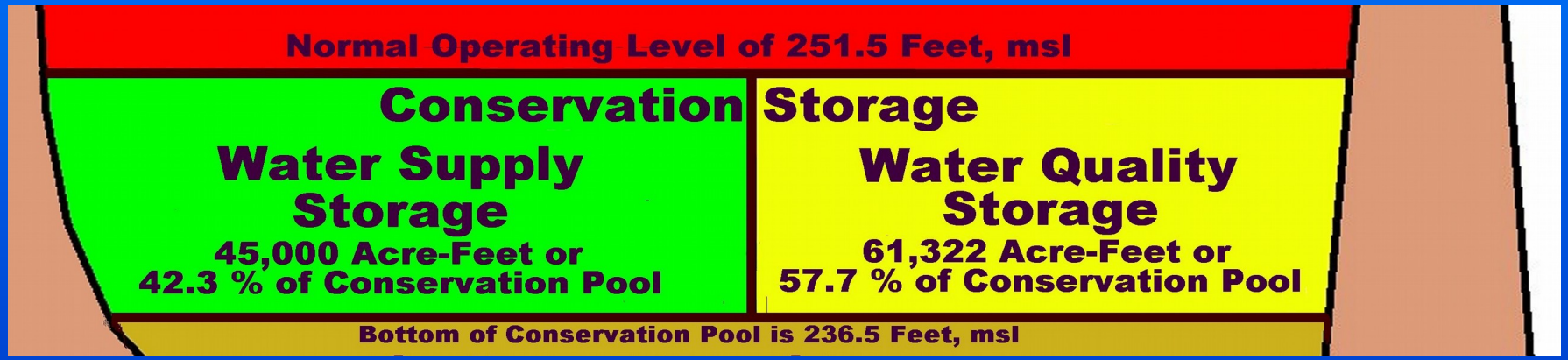
The process is identical to determining the remaining cash in a typical personal checking account.

Falls Lake Storage Accounting

Daily net inflow is used in this process which includes losses such as leakage and the effects from net precipitation-evaporation accounted for.

Factoid: On a hot, dry and breezy summer day on Falls Lake, water loss from evaporation can range from 100 to 150 cubic feet per

Falls Lake Storage Accounting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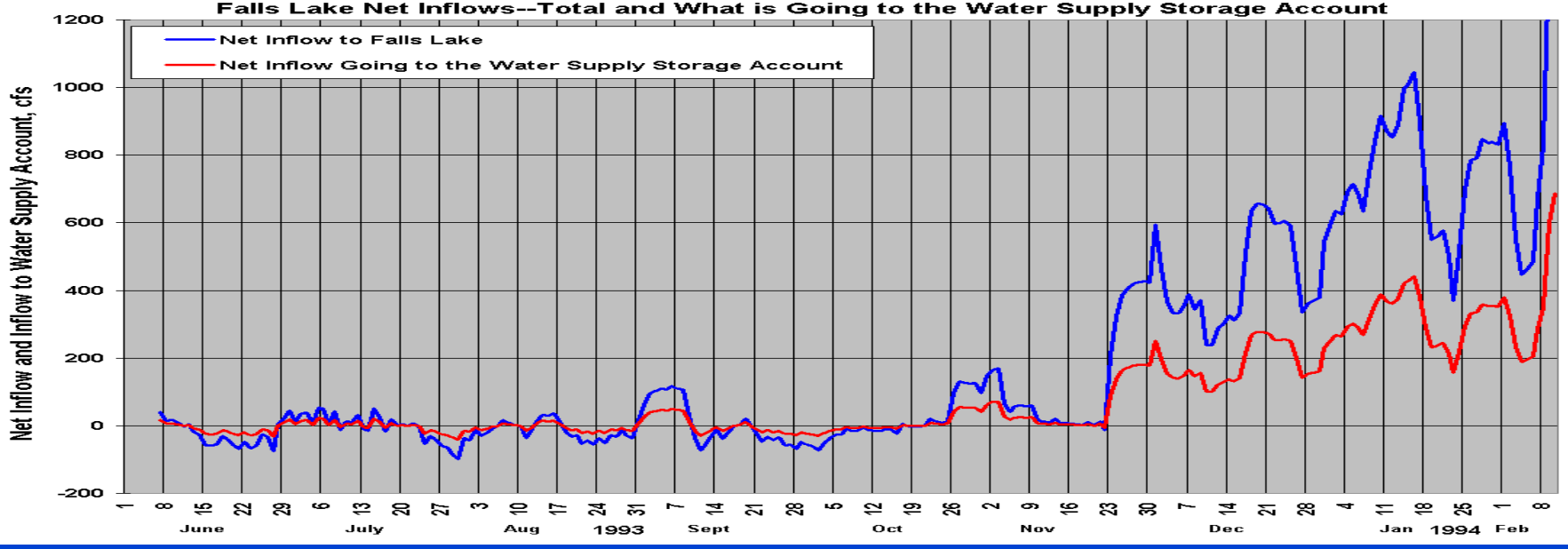
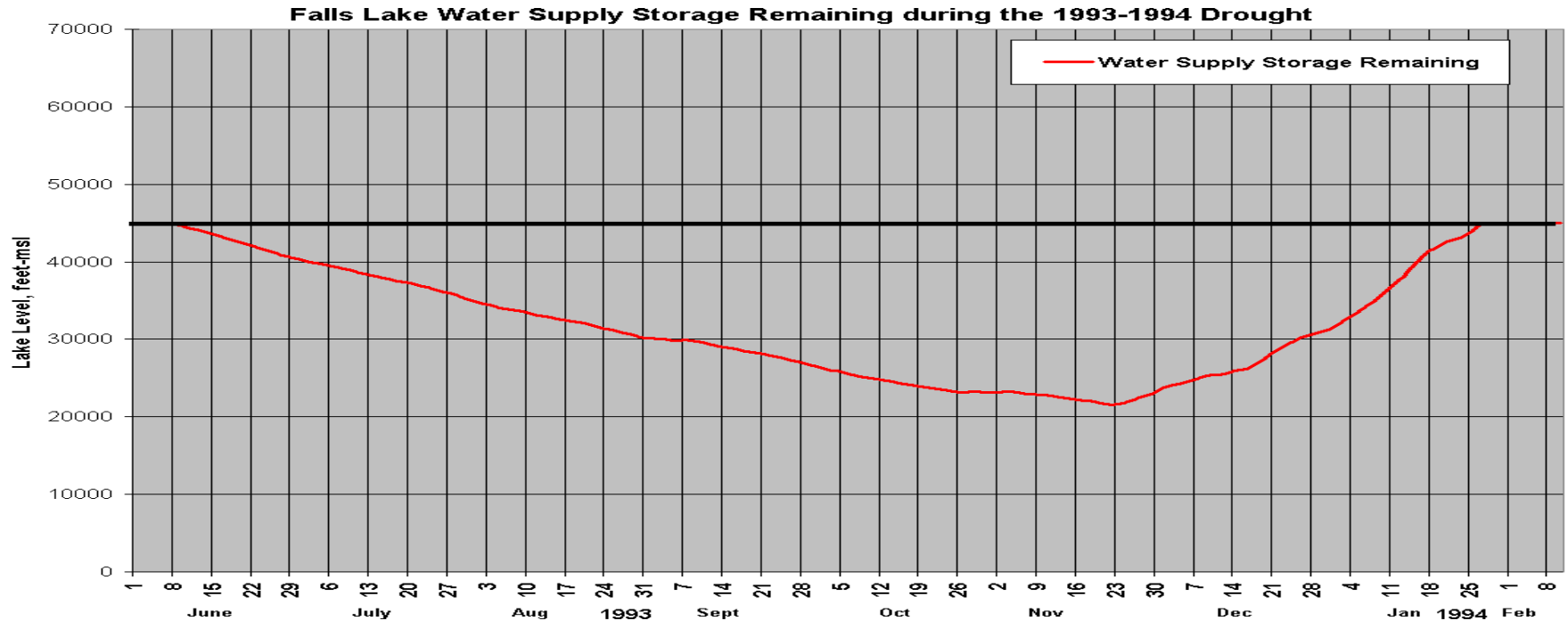
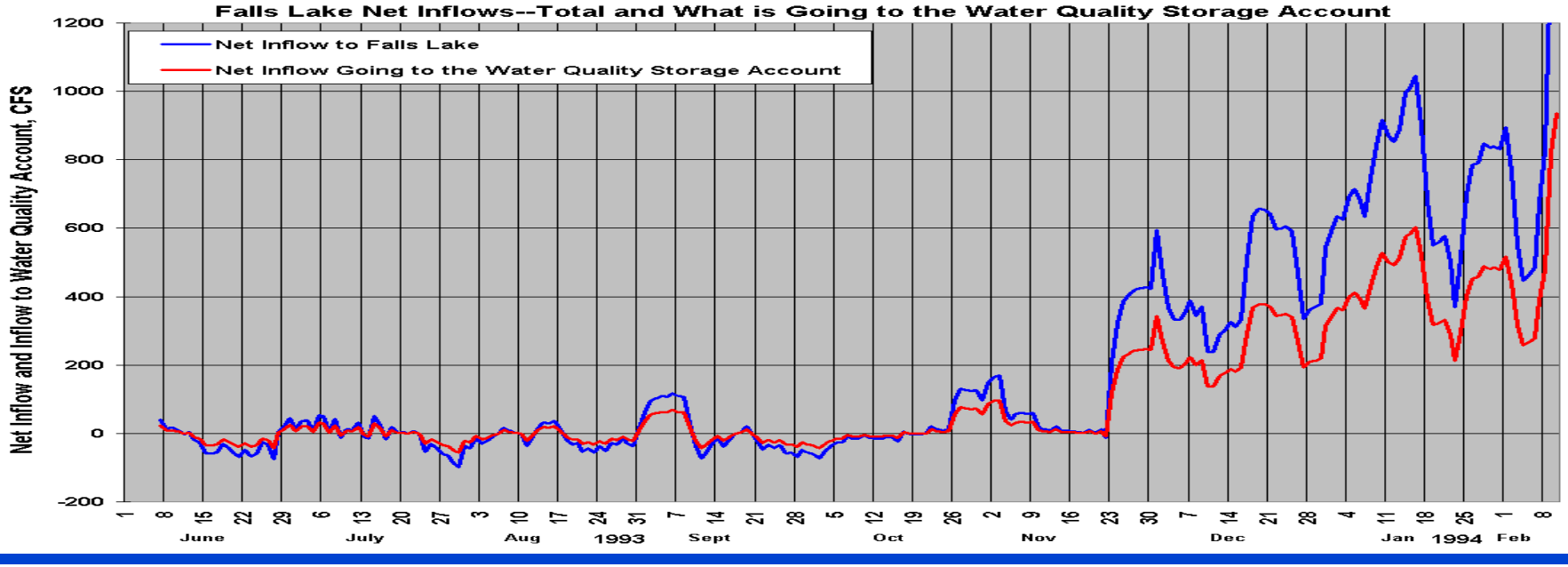
- **Each day, 42.3 percent of the net inflow is given or "deposited" in the water supply account and 57.7 percent of the net inflow is given or "deposited" in the water quality account.**
- **Each day, each account is debited by the amount of use to meet that specific project purpose for that day.**


Falls Lake Net Inflows--Total and What is Going to the Water Supply Storage Account
Net Inflow to Falls Lake
Net Inflow Going to the Water Supply Storage Account
Net Inflow and Inflow to Water Supply Account, cfs
1200
1000
800
600
400
200
0
-200
June
July
Aug
1993
Sept
Oct
Nov
Dec
Jan
1994
Feb


Falls Lake Water Supply Storage Remaining during the 1993-1994 Drought
Water Supply Storage Remaining
Lake Level, feet-msl
70000
60000
50000
40000
30000
20000
10000
0
June
July
Aug
1993
Sept
Oct
Nov
Dec
Jan
1994
Feb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Net Inflow to Falls Lake
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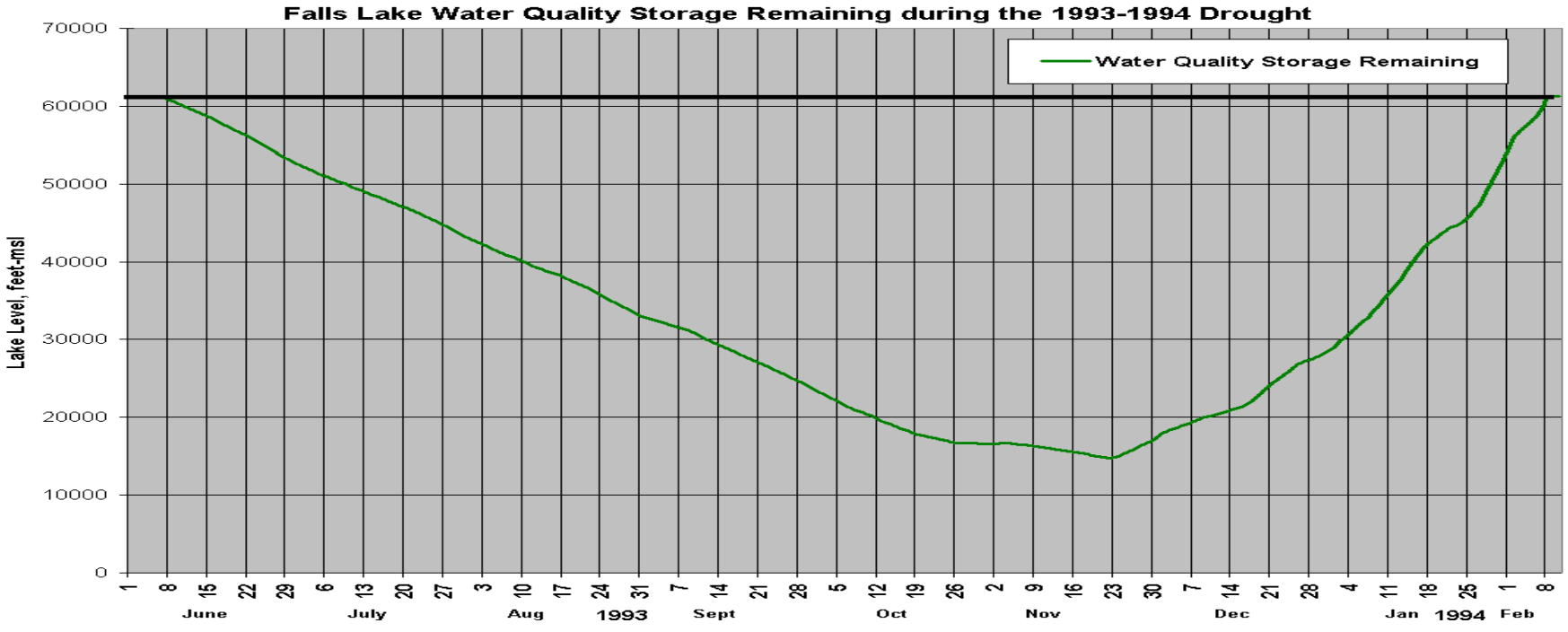
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	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1								---------Water Quality Pool Computations---------						
2				--Water Supply Pool Computations--					Inflow to					
3									Water					
4				Inflow				Inflow	Quality					
5				to			Spill	to	Pool			Spill		
6				Water	Water	Water	From	Water	Plus Spill	Water	Water	From		
7				Supply	Supply	Supply	Water	Quality	from Water	Quality	Quality	Water	Falls	Falls
8			Net	Pool	With-	Pool	Supply	Pool	Supply	With-	Pool	Quality	Lake	Lake
9			Inflow	42.3% Net	drawal	Balance	Pool	57.7% Net	Pool	drawal	Balance	Pool	Storage	Elevation
10		1993	DSF	DSF	DSF	Ac-Ft	DSF	DSF	DSF	DSF	Ac-Ft	DSF	Ac-Ft	Ft-MSL
17	June	6				45000					61322		125940	251.50
18		7	40	17	46	44942	0	23	23	152	61066	0	125626	251.47
19		8	14	6	56	44843	0	8	8	152	60780	0	125241	251.44
20		9	16	7	91	44676	0	9	9	152	60497	0	124791	251.40
21		10	11	5	97	44492	0	6	6	152	60208	0	124318	251.36
22		11	-2	-1	96	44301	0	-1	-1	152	59905	0	123823	251.32
23		12	3	1	90	44125	0	2	2	152	59607	0	123350	251.29
24		13	-19	-8	95	43920	0	-11	-11	152	59283	0	122822	251.24
25		14	-26	-11	94	43712	0	-15	-15	152	58952	0	122282	251.20
26		15	-59	-25	88	43488	0	-34	-34	152	58584	0	121690	251.15
27		16	-59	-25	79	43282	0	-34	-34	151	58216	0	121116	251.11
28		17	-55	-23	81	43075	0	-32	-32	151	57854	0	120546	251.06
29		18	-31	-13	81	42888	0	-18	-18	151	57518	0	120024	251.02
30		19	-43	-18	93	42667	0	-25	-25	151	57170	0	119455	250.97
31		20	-56	-24	94	42434	0	-32	-32	151	56807	0	118859	250.92
32		21	-69	-29	69	42240	0	-40	-40	151	56428	0	118286	250.87
33		22	-48	-20	78	42044	0	-28	-28	151	56073	0	117735	250.82
34		23	-66	-28	99	41792	0	-38	-38	151	55698	0	117108	250.77
35		24	-59	-25	99	41546	0	-34	-34	151	55330	0	116494	250.72
36		25	-26	-11	98	41330	0	-15	-15	186	54931	0	115879	250.66
37		26	-33	-14	93	41117	0	-19	-19	208	54481	0	115216	250.61
38		27	-75	-32	96	40864	0	-43	-43	208	53982	0	114464	250.54
39		28	3	1	99	40670	0	2	2	208	53574	0	113862	250.49
40		29	21	9	98	40494	0	12	12	208	53185	0	113296	250.44
41		30	45	19	97	40339	0	26	26	208	52824	0	112781	250.40
42	July	1	11	5	98	40154	0	6	6	189	52462	0	112234	250.35
43		2	36	15	94	39998	0	21	21	179	52148	0	111764	250.31

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5				to			Spill	to	Pool			Spill		
6				Water	Water	Water	From	Water	Plus Spill	Water	Water	From		
7				Supply	Supply	Supply	Water	Quality	from Water	Quality	Quality	Water	Falls	Falls
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9			Inflow	42.3% Net	drawal	Balance	Pool	57.7% Net	Pool	drawal	Balance	Pool	Storage	Elevation
10		1994	DSF	DSF	DSF	Ac-Ft	DSF	DSF	DSF	DSF	Ac-Ft	DSF	Ac-Ft	Ft-MSL
240		15	1009	427	65	39635	0	582	582	69	39910	0	99163	249.17
241		16	1044	442	57	40398	0	603	603	69	40968	0	100984	249.33
242		17	899	380	25	41102	0	519	519	69	41860	0	102580	249.48
243		18	682	289	52	41572	0	394	394	69	42504	0	103694	249.58
244		19	549	232	54	41925	0	317	317	69	42995	0	104539	249.66
245		20	557	236	55	42284	0	321	321	69	43496	0	105398	249.74
246		21	577	244	51	42667	0	333	333	70	44018	0	106302	249.83
247		22	503	213	90	42910	0	290	290	70	44454	0	106982	249.89
248		23	369	156	58	43104	0	213	213	70	44737	0	107460	249.93
249		24	512	217	64	43407	0	295	295	70	45184	0	108209	250.00
250		25	697	295	59	43874	0	402	402	70	45843	0	109335	250.10
251		26	785	332	59	44416	0	453	453	70	46603	0	110637	250.21
252		27	790	334	21	45000	19	456	475	70	47406	0	112024	250.33
253		28	847	358	33	45000	325	489	814	70	48882	0	113500	250.46
254		29	835	353	79	45000	274	482	756	70	50242	0	114860	250.58
255		30	839	355	63	45000	292	484	776	70	51642	0	116260	250.70
256		31	831	352	16	45000	336	479	815	70	53120	0	117738	250.82
257	Feb	1	896	379	30	45000	349	517	866	70	54699	0	119317	250.96
258		2	764	323	56	45000	267	441	708	70	55964	0	120582	251.06
259		3	551	233	77	45000	156	318	474	70	56766	0	121384	251.13
260		4	446	189	78	45000	111	257	368	70	57357	0	121975	251.18
261		5	463	196	44	45000	152	267	419	70	58049	0	122667	251.23
262		6	485	205	59	45000	146	280	426	70	58755	0	123373	251.29
263		7	672	284	19	45000	265	388	653	70	59912	0	124530	251.38
264		8	829	351	47	45000	304	478	782	70	61322	2	125942	251.50
265		9	1418	600	47	45000	553	818	1371	70	61322	2580	128522	251.70
266		10	1622	686	75	45000	611	936	1547	70	61322	2930	131451	251.94